

CLAIMS

1. A control system for controlling an operation of at least one apparatus, comprising:

5           a rhythm input section of outputting, as an input rhythm signal, an electrical signal whose amplitude level varies depending on a tap input from a user, the tap input corresponding to a pronunciation pattern of a name indicating the contents of a control of the apparatus;

10           a rhythm dictionary storage section of storing a rhythm dictionary table for associating the contents of the control of the apparatus with a registered rhythm pattern typifying the pronunciation pattern of the name indicating the contents of the control; and

15           a control section of controlling the operation of the apparatus,

              wherein the control section comprises:

              an input rhythm pattern recognition means of analyzing the input rhythm signal input from the rhythm input section to 20 recognize an input rhythm pattern; and

              an apparatus control means of referencing the rhythm dictionary table to search for a registered rhythm pattern matching the input rhythm pattern recognized by the input rhythm pattern recognition means, and based on the contents of the control 25 corresponding to the registered rhythm pattern, controlling the

apparatus.

2. The control system according to claim 1, wherein in the rhythm dictionary table, the registered rhythm pattern is defined

5 by dividing the name indicating the contents of the control into at least one predetermined unit, and thereafter, assigning a predetermined unit rhythm pattern to each divided unit, and

the input rhythm pattern recognition means recognizes the input rhythm pattern by simplifying a temporal change in the

10 amplitude level of the input rhythm signal.

3. The control system according to claim 2, wherein the unit rhythm pattern is defined by assigning the presence or absence of a beat to the presence or absence of a sound in the predetermined

15 unit, and

the input rhythm pattern recognition means recognizes a beat timing at which the user taps the rhythm input section and/or a silent beat timing at which no tap is made for a predetermined

time, based on the temporal change in the amplitude level, and

20 recognizes the input rhythm pattern by representing the temporal change of the input rhythm signal using the beat and/or silent beat timing.

4. The control system according to claim 3, wherein an

25 intensity of the sound of the predetermined unit is further defined

in the unit rhythm pattern, and

the input rhythm pattern recognition means further recognizes an intensity of a tap at the beat timing in a stepwise manner based on an intensity of the amplitude level, and represents 5 the intensity of the tap at the beat timing so that a strong tap is distinguished from a weak tap to recognize the input rhythm pattern.

5. The control system according to claim 3, wherein the input 10 rhythm pattern recognition means further recognizes the input rhythm pattern such that there are a beat time and a silent beat time when the user continues to press the rhythm input section for the predetermined interval time.

15 6. The control system according to claim 2, wherein the unit rhythm pattern is defined by assigning the presence or absence of a beat to the presence or absence of a sound in the predetermined unit, and

the input rhythm pattern recognition means detects the 20 presence or absence of the beat based on the degree of the amplitude level, assumes all possible rhythm patterns having beats in the number of detected beats, searches the assumed rhythm patterns for a rhythm pattern best matching a tendency of the temporal change of the input rhythm signal, and recognizes the retrieved rhythm 25 pattern as the input rhythm pattern.

7. The control system according to claim 6, wherein the input rhythm pattern recognition means obtains a difference between a time interval between two adjacent beats in the assumed rhythm pattern and a time interval between two adjacent beats in the input rhythm signal, and recognizes a rhythm pattern having a smallest average value of the difference among the assumed rhythm patterns as the input rhythm pattern.

10 8. The control system according to claim 6, wherein when the beats are equally spaced in the recognized input rhythm pattern, the input rhythm pattern recognition means further determines whether or not the interval of the beat exceeds a predetermined interval time, and when the interval of the beat exceeds the 15 predetermined interval time, newly recognizes that the input rhythm pattern is a rhythm pattern in which a beat and a silent beat are continually repeated, or when the interval of the beat does not exceed the predetermined interval time, newly recognizes that the input tap pattern is a rhythm pattern in which only a beat is 20 continually repeated.

9. The control system according to claim 6, wherein an intensity of the sound of the predetermined unit is further defined in the unit rhythm pattern, and

25 the input rhythm pattern recognition means further

recognizes an intensity of a tap at the beat timing in a stepwise manner based on an intensity of the amplitude level, and represents the intensity of the tap at the beat timing so that a strong tap is distinguished from a weak tap to recognize the input rhythm 5 pattern.

10. The control system according to claim 2, wherein the unit rhythm pattern is defined by assigning the presence or absence of a beat to the presence or absence of a sound in the predetermined 10 unit, and

the input rhythm pattern recognition means searches the rhythm patterns registered in the rhythm dictionary table for a rhythm pattern best matching a tendency of the temporal change of the input rhythm signal, and recognizes the retrieved rhythm 15 pattern as the input rhythm pattern.

11. The control system according to claim 10, wherein the input rhythm pattern recognition means detects the presence or absence of the beat based on the degree of the amplitude level, 20 searches the rhythm patterns registered in the rhythm dictionary table for a rhythm pattern having beats in the number of the detected beats, and further searches the retrieved rhythm patterns for a rhythm pattern best matching a tendency of the temporal change, and recognizes the finally retrieved rhythm pattern as the input 25 rhythm pattern.

12. The control system according to claim 11, wherein when further searching for a rhythm pattern best matching the tendency of the temporal change, the input rhythm pattern recognition means 5 obtains a difference between a time interval between two adjacent beats in the retrieved rhythm pattern and a time interval between two adjacent beats in the input rhythm signal, and recognizes a rhythm pattern having a smallest average value of the difference among the retrieved rhythm patterns as the input rhythm pattern.

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13. The control system according to claim 10, wherein an intensity of the sound of the predetermined unit is further defined in the unit rhythm pattern, and

the input rhythm pattern recognition means further 15 recognizes an intensity of a tap at the beat timing in a stepwise manner based on an intensity of the amplitude level, and represents the intensity of the tap at the beat timing so that a strong tap is distinguished from a weak tap to recognize the input rhythm pattern.

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14. The control system according to claim 2, wherein the unit rhythm pattern is defined by assigning the presence or absence of a beat to the presence or absence of a sound in the predetermined unit, and

25 the input rhythm pattern recognition means detects the

presence or absence of the beat based on the degree of the amplitude level, obtains a smallest one of time intervals between two adjacent beats in the input rhythm signal, determines whether or not there is a silent beat between the two adjacent beats based on a relative 5 value obtained by comparing the smallest time interval and a time interval between two other beats, and represents the temporal change of the input rhythm signal using a timing of the beat and/or the silent beat to recognize the input rhythm pattern.

10 15. The control system according to claim 14, wherein an intensity of the sound of the predetermined unit is further defined in the unit rhythm pattern, and

the input rhythm pattern recognition means further recognizes an intensity of a tap at the beat timing in a stepwise 15 manner based on an intensity of the amplitude level, and represents the intensity of the tap at the beat timing so that a strong tap is distinguished from a weak tap to recognize the input rhythm pattern.

20 16. The control system according to claim 2, wherein the predetermined unit for dividing the name of the contents of the control is a mora unit.

25 17. The control system according to claim 2, wherein the predetermined unit for dividing the name of the contents of the

control is a syllabic unit.

18. The control system according to claim 2, wherein the control section further comprises a rhythm pattern edition means 5 of editing contents registered in the rhythm dictionary table in response to an instruction of the user.

19. The control system according to claim 18, wherein the rhythm pattern edition means causes the input rhythm pattern 10 recognition means to recognize an input rhythm pattern intended by the user tapping the rhythm input section, and registers the input rhythm pattern as a registered rhythm pattern in the rhythm dictionary table.

15 20. The control system according to claim 18, wherein the rhythm pattern edition means divides the name of a control represented by character information input by the user into at least one predetermined unit, assigns a predetermined unit rhythm 20 pattern to each divided unit to define a rhythm pattern, and registers the rhythm pattern as a registered rhythm pattern in the rhythm dictionary table.

21. The control system according to claim 18, wherein the rhythm pattern edition means edits the registered contents of the 25 rhythm dictionary table while confirming duplication of the

registered rhythm pattern.

22. The control system according to claim 2, wherein the control system is mounted in a vehicle.

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23. The control system according to claim 22, wherein the rhythm input section is disposed on a steering wheel of the vehicle and has a structure which allows confirmation of a position by the sense of touch.

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24. The control system according to claim 2, wherein, in the rhythm dictionary table, the contents of the control is defined in a hierarchical structure,

the apparatus control means memorizes a hierarchical layer currently searched, and searches matching of the input rhythm pattern and the registered rhythm pattern in the currently searched hierarchical layer, and

the rhythm input section further comprises a hierarchical layer switching means for causing the apparatus control means to switch the currently searched hierarchical layer.

25. The control system according to claim 24, wherein the rhythm input section comprises two or more input devices for inputting a tap by the user, and

the hierarchical layer switching means causes the apparatus

control means to switch the currently searched hierarchical layer when the input device to be tapped is switched.

26. The control system according to claim 2, wherein a  
5 user-specific registered rhythm pattern is defined in the rhythm dictionary table, and

the apparatus control means searches for a matching registered rhythm pattern for each user.

10 27. The control system according to claim 2, wherein the input rhythm pattern recognition means memorizes a parameter required for detection of the temporal change of the input rhythm signal, and analyzes the input rhythm signal based on the parameter for each user.

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28. The control system according to claim 2, further comprising an output section of informing the user of a result of the search by the apparatus control means in terms of whether or not there is a matching registered rhythm pattern.

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29. The control system according to claim 2, further comprising a sensation output section of causing the user to sense the rhythm pattern registered in the rhythm dictionary table in response to an instruction of the user.

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30. The control system according to claim 2, wherein when the amplitude of the input rhythm signal is at a LOW level for a predetermined time, the input rhythm pattern recognition means recognizes the input rhythm pattern assuming that the input is 5 ended.

31. A method for controlling an operation of at least one apparatus using a computer apparatus, comprising the steps:

the computer apparatus analyzes an electrical signal input 10 to the computer apparatus to recognize an input rhythm pattern;

the computer apparatus references a rhythm dictionary table for associating the contents of a control of the apparatus with a registered rhythm pattern typifying a pronunciation pattern of a name indicating the contents of the control of the apparatus, 15 the rhythm dictionary table being stored in the computer apparatus, to search for a registered rhythm pattern matching the recognized input rhythm pattern; and

the computer apparatus controls the apparatus based on the contents of the control corresponding to the registered rhythm 20 pattern.

32. A program for controlling an operation of at least one piece of software using a computer apparatus, comprising the steps:

the computer apparatus analyzes an electrical signal input 25 to the computer apparatus to recognize an input rhythm pattern;

the computer apparatus references a rhythm dictionary table for associating the contents of a control of the apparatus with a registered rhythm pattern typifying a pronunciation pattern of a name indicating the contents of the control of the apparatus,

5 the rhythm dictionary table being stored in the computer apparatus, to search for a registered rhythm pattern matching the recognized input rhythm pattern; and

the computer apparatus controls the apparatus based on the contents of the control corresponding to the registered rhythm

10 pattern.